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EDITOR
Ana Teresa Caldeira, António Candeias, António Pereira and M. Rosário Martins
HERCULES Laboratory

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Nuno Carriço & Vanda Amaral

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Microbiological Resource Centres: Innovative Solutions to Underpinning the Research and the Bioeconomy

Nelson Lima

Center of Biological Engineering, Micoteca da Universidade do Minho, Portugal.
European Culture Collections' Organisation.

Microbiology as a scientific discipline recognised the need to preserve microorganisms for scientific studies establishing from its very beginning research culture collections (CC). Later on, to better serve different scientific fields and bioindustries with the increasing number of strains of scientific, medical, ecological and biotechnological importance public service CC were established with the specific aims to support their user communities. Currently, the more developed public service CC are recognised as microBiological Resources Centres (mBRC). mBRC are considered to be one of the key elements for sustainable international scientific infrastructure, which is necessary to underpin successful delivery of the benefits of biotechnology, whether within the health sector, the industrial sector or other sectors, and in turn ensure that these advances help drive economic growth. In more detail, mBRCs are defined by OECD-Organisation for Economic Co-operation and Development [1] as service providers and repositories of the living cells, genomes of organisms, and information relating to heredity and functions of biological systems. mBRCs contain collections of culturable organisms (e.g., microorganisms, plant, animal cells), replicable parts of these (e.g., genomes, plasmids, virus, cDNAs), viable but not yet culturable organisms, cells and tissues, as well as database containing molecular, physiological and structural information relevant to these collections and related bioinformatics. Thus mBRCs are fundamental to harnessing and preserving the world's microbial biodiversity and genetic resources and serve as an essential element of the infrastructure for research and development working under a high quality criteria and legal framework [2]. mBRCs serve a multitude of functions and assume a range of shapes and forms. Some are large national centres performing a comprehensive role providing access to diverse organisms. Other centres play much narrower, yet important, roles supplying limited but crucial specialised resources. In the era of the knowledge-based bio-economy mBRCs are recognised as vital element to underpinning the biotechnology.

The European Culture Collections' Organisation (ECCO) was established in 1981. The aim of the organisation is to promote collaboration and exchange of ideas and information about all aspects of culture collection activity. ECCO meetings are held annually and are a valuable forum for discussion and innovation on the future development of member collection activities. The organization has evolved for an important think tank with important contributions through collaborative projects like the MINE EU project in the mid-1980s to bundle the common interests of microbial service collections and their users. In the subsequent CABRI EU project, some of the leading collections in Europe made available the contents of their individual catalogues for comparison via a search engine which provides access to a common Catalogue (www.cabri.org). Later on, the EBRCN EU project focused on guidelines for best practice towards an ISO-compliant quality management. These outputs were key-elements for the OECD initiative related with the mBRCs task-force and the current OECD guidelines for mBRCs. More recently, the EMbaRC (www.embarc.eu) project enlarged the spectrum of activities and dealt with contemporary topics such as biological safety, improved identification methods and the development new concepts on training and education. The European Microbial DNA Network (www.microdnabank.eu) was also

launched as major contribution of this project. Finally, inside of ECCO organisation another important developed project is the current MIRRI (www.mirri.org). MIRRI is a pan-European distributed research infrastructure in its Preparatory Phase which aims to support research and development in the field of biotechnology. Currently, more than 40 public CC and research institutes from 19 European countries collaborate to establish this infrastructure.
This cascade of projects has had ECCO as incubator and several CC as lead partners. Moreover, documents that have addressed legal framework of CC operation, like Material Transfer Agreement (MTA) were also developed inside ECCO and a core MTA is now available to all CC that want adhere. Certainly that many other topics are in discussion inside of ECCO, like the implications of Nagoya Protocol and the recent Access and Benefit Sharing (ABS) European regulation EU-511/2014 adopted by the European Parliament and the Council with regards the deposit of non-type materials in collections.
mBRCs need work altogether at regional and global level to exchange biological materials within the same international framework and under the same quality criteria defined by third parties of certification/accreditation systems. At same time a new vision for the mBRCs activities with new innovative solutions are being implemented to enlarge their business plans and to Underpinning the research and the bioeconomy.

[1] OECD (2001). Biological Resource Centres. Underpinning the future of life sciences and biotechnology, pp. 1-66.
[2] OECD (2007). Best Practice Guidelines for Biological Resource Centres, pp. 1-115.